National Center for Science and Engineering Statistics

InfoBrief

New Survey Shows R&D Performance Within Federal Facilities Totaled $34.5 Billion in FY 2022

NSF 25-305 | November 2024

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In FY 2022, federal government facilities performed $34.5 billion of research and experimental development (R&D) (table 1). Data presented in this InfoBrief are from the new Federal Facilities Research and Development (FFRD) Survey sponsored by the National Center for Science and Engineering Statistics within the U.S. National Science Foundation. These data represent the first ever direct measurement of the performance of R&D within federal facilities. Note that this survey does not include the 42 designated federally funded research and development centers (FFRDCs), since they are surveyed separately.[1]

Table 1

Federal facility research, development, test, and evaluation expenditures, by type of facility and type of RDT&E: FY 2022

(Millions of dollars)

Type of facility	RDT&E expenditures					
	All RDT&E	R&D				Operational system development
		All R&D	Basic research	Applied research	Experimental development	
All federal facilities	36,062	34,497	4,749	9,570	20,178	1,565
DOD facilities	22,429	20,864	763	2,785 i	17,316	1,565
Non-DOD facilities	na	13,633	3,986	6,785	2,862	na

i = more than 50% of the estimate is imputed; na = not applicable.

DOD = Department of Defense; RDT&E = research, development, test, and evaluation.

Source(s):
National Center for Science and Engineering Statistics, Federal Facilities Research and Development Survey, FY 2022.

Until now, the only measure of federal R&D performance was an indirect measurement made possible by the Survey of Federal Funds for Research and Development (Federal Funds for R&D).[2] Federal Funds for R&D is a long-standing survey that measures annual R&D obligations by agency and by recipient sector, including the federal sector. Federal R&D obligations to federal performers are also referred to as intramural R&D obligations, which have historically been used as

a proxy for federal R&D performance. However, there are some limitations inherent in using obligations as a measure of federal performance. A key limitation is that the funding obligated to intramural R&D in a fiscal year is not the same as the expenditures in that fiscal year. Obligations reflect the amount committed to R&D projects in that year, which could be spent over several subsequent years; expenditures reflect only the funds spent on R&D conducted that year. Also, there are several differences between the intramural R&D obligations reported on Federal Funds for R&D and the new detail being requested on the FFRD Survey. First, the level of detail on Federal Funds for R&D is limited to the overall obligation total at the agency level. Also, because the intramural total from Federal Funds for R&D includes interagency transfers of funds as well as the costs for administration of external R&D contracts, it is unclear how much R&D was performed within a specific agency.

The FFRD Survey,[3] in contrast, collects R&D expenditure data at the facility level. Therefore, it is now possible to report the total annual expenditures on R&D performed within the federal sector by agency and by the facility where it is being performed and to directly compare federal R&D expenditures with the expenditures reported on the other R&D performer surveys.[4] The remainder of this InfoBrief provides an overview of the data collected in this new survey.

Total by Type of Facility and Type of R&D

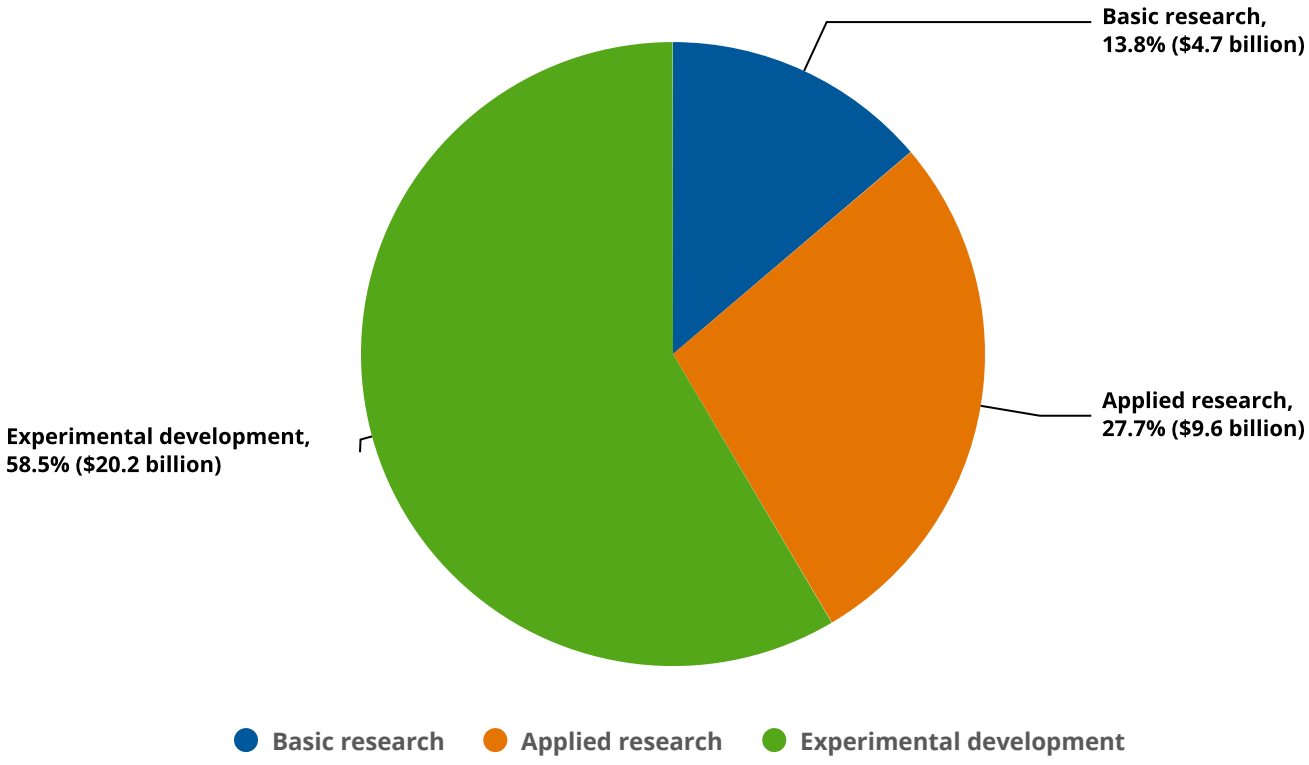
Of the $34.5 billion total reported in R&D expenditures on the FFRD Survey, $20.9 billion of R&D was performed within Department of Defense (DOD) facilities and $13.6 billion was performed within non-DOD facilities (table 1).

Because of DOD's use of standardized budget classifications for their work, DOD facility performance can be further classified into both R&D and research, development, test, and evaluation (RDT&E). Although RDT&E includes basic research, applied research, and experimental development, it also includes the non-R&D category of operational system development (OSD).[5] DOD's expenditures for OSD activities constitute last-stage preproduction of weapons systems or other military hardware that have received approval for low-rate initial production but are beyond the scope of traditional R&D.[6] Within DOD facilities, performance of OSD activities accounted for an additional $1.6 billion in expenditures.

Across all federal facilities, the majority of the R&D was categorized by the respondents as experimental development (59%, or $20.2 billion) (figure 1 and table 1). Nearly a third was applied research (28%, or $9.6 billion), and the remaining 14% was categorized as basic research ($4.7 billion). Underlying this overall breakdown were differences between DOD and non-DOD facilities. Within DOD facilities, the vast majority of the R&D expenditures were for experimental development work (83%, or $17.3 billion), compared with only 21% within non-DOD facilities ($2.9 billion) (table 1).

Figure 1

Federal facility R&D expenditures, by type of R&D: FY 2022



Source(s):
National Center for Science and Engineering Statistics, Federal Facilities Research and Development Survey, FY 2022.

Sources of Funding

Of the $34.5 billion spent on R&D performed within federal facilities, 99%, or $34.1 billion, was funded by federal government sources (table 2). Only two agencies reported more than 1% of their funding came from nonfederal sources. The Department of Transportation's facilities, including facilities managed by the Federal Aviation Administration and the Federal Highway Administration, received 34% of their funding for R&D from nonfederal sources ($44 million). These sources were primarily businesses and other organizations not elsewhere specified. The Department of the Interior's facilities, including facilities managed by the Bureau of Ocean Energy Management, the U.S. Geological Survey, and the Fish and Wildlife Service, received 12% of their funding for R&D from state and local governments or other organizations not elsewhere specified ($138 million).

Table 2

Federal facility R&D expenditures, by agency and source of funds: FY 2022

(Millions of dollars)

Agency	All R&D expenditures		Source of funds									
			Federal government		State and local government		Businesses		Nonprofit organizations		All other organizations	
All agencies	34,497		34,068		117		72		11		228	
Department of Agriculture	1,685		1,661	i	9		1		2		13	
Department of Commerce	1,374		1,372		0		0		0		1	
Department of Defense	20,864		20,681		1		26		6		149	
Department of Energy[a]	100		100		0	i	0	i	0	i	0	i
Department of Health and Human Services	3,360		3,322		0		17		3		18	
Department of Homeland Security	39		39		0		0		0		0	
Department of the Interior	1,171		1,033		106		0		0		32	
Department of Transportation	130		85		1		27		1		15	
Department of Veterans Affairs	1,529		1,529		0		0		0		0	
Environmental Protection Agency	292		292		0		0		0		0	
National Aeronautics and Space Administration	3,765		3,765		0		0		0		0	
Other agencies	188	i	188	i	0	i	0	i	0	i	0	i

i = more than 50% of the estimate is imputed.

[a] The majority of the Department of Energy's R&D performance is conducted in its federally funded research and development centers (FFRDCs). See the FFRDC R&D Survey data tables for more information.

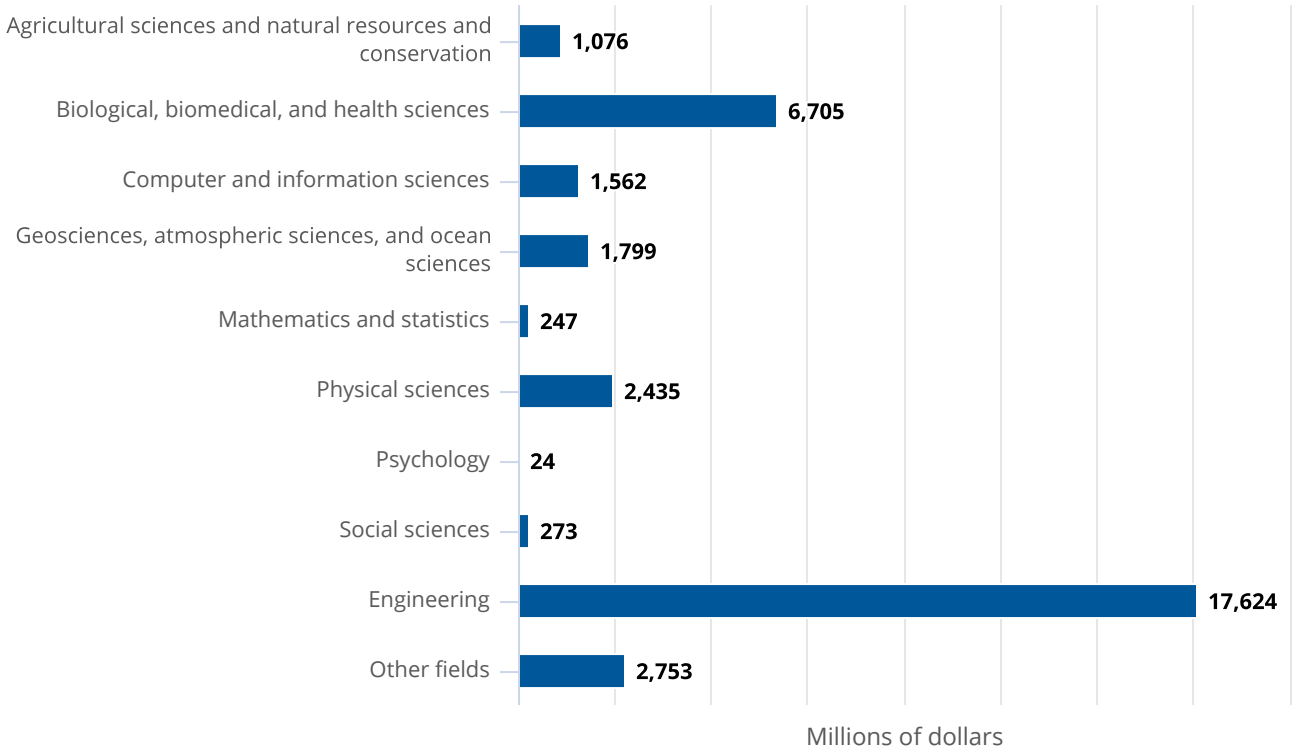
Source(s):
National Center for Science and Engineering Statistics, Federal Facilities Research and Development Survey, FY 2022.

R&D Field

Just over half (51%, or $17.6 billion) of the R&D performed within federal facilities was within the field of engineering (figure 2). This encompasses a wide array of work in subfields such as aerospace, biomedical, chemical, civil, environmental, electrical, computer, industrial, systems, mechanical, materials, and geological engineering. The next-largest field was biological, biomedical, and health sciences (19%, or $6.7 billion).

Figure 2

Federal facility R&D expenditures by R&D field: FY 2022



Note(s):
More than 50% of the estimate is imputed for agricultural sciences and natural resources and conservation and for other fields.

Source(s):
National Center for Science and Engineering Statistics, Federal Facilities Research and Development Survey, FY 2022.

R&D expenditures within many agencies were heavily concentrated within a mission-oriented field, such as the Department of Health and Human Services with 95% of their facilities' R&D expenditures ($3.2 billion out of $3.4 billion) categorized in the fields of biological, biomedical, and health sciences (table 3). DOD facilities made up the majority (84%, or $14.9 billion) of the overall $17.6 billion spent on engineering R&D performed in federal facilities. However, the DOD facilities conducted another $6.0 billion in R&D (29% of their total) across the other R&D fields.

Table 3

Federal facility R&D expenditures, by agency and R&D field: FY 2022

(Millions of dollars)

Agency	All R&D expenditures		R&D field																					
			Agricultural sciences and natural resources and conservation		Biological, biomedical, and health sciences		Computer and information sciences		Geosciences, atmospheric sciences, and ocean sciences		Mathematics and statistics		Physical sciences		Psychology		Social sciences		Engineering		Other fields	
All agencies	34,497		1,076	i	6,705		1,562		1,799		247		2,435		24		273		17,624		2,753	i
Department of Agriculture	1,685		875	i	476	i	12		5	i	5		87	i	0		85		12	i	129	i
Department of Commerce	1,374		0		29		201		558		16		229		0		91		231		19	
Department of Defense	20,864		61		823		1,304		124		211		917		13		40		14,852		2,520	i
Department of Energy[a]	100		0		0	i	0	i	10	i	0		16	i	0		0	i	75	i	0	
Department of Health and Human Services	3,360		63		3,192		33		0		5		9		2		11		41		4	
Department of Homeland Security	39		2		0		1	i	0		4		6		1		0		26		0	
Department of the Interior	1,171		33		387		2		712		0		2		0		21		13		1	
Department of Transportation	130		0		16		5		11		4		0		8		0		75		10	
Department of Veterans Affairs	1,529		0		1,529		0		0		0		0		0		0		0		0	
Environmental Protection Agency	292		33		83		4		121		2		7		0		2		41		0	
National Aeronautics and Space Administration	3,765		0		119		0		240		0		1,126		0		0		2,221		59	
Other agencies	188	i	10	i	50	i	0	i	20	i	0	i	34	i	0	i	22	i	38	i	11	i

i = more than 50% of the estimate is imputed.

[a] The majority of the Department of Energy's R&D performance is conducted in its federally funded research and development centers (FFRDCs). See the FFRDC R&D Survey data tables for more information.

Source(s):
National Center for Science and Engineering Statistics, Federal Facilities Research and Development Survey, FY 2022.

Data Sources, Limitations, and Availability

Detailed tables showing these data by reporting facility are available at https://ncses.nsf.gov/surveys/federal-facilities-research-development/.

The survey was conducted in the fall of 2023 as a census of the population of federally owned and operated facilities in the United States that performed R&D in FY 2022.[7] The overall response rate was 94%. Imputation was performed to account for nonresponding facilities. The survey collected information on R&D expenditures by type of R&D, source of funding, and R&D field; R&D funding provided to others; and counts of R&D personnel. Due to low item response rates for the questions on funding to others and R&D personnel counts, limited data are available. Data on R&D funding to others are not included in the data tables for this cycle. R&D personnel counts (data tables: table 6 and table 7) are displayed only for the facilities that provided these data; no imputed or aggregate estimates are provided for FY 2022.

A facility is defined as a unit within the agency that is responsible for performing R&D, generally with its own distinct budget and leadership. Because each agency has a different organizational structure, this unit of measurement may be a division, branch, center, lab, or other entity, and units may span multiple locations. Because of this, the total number of reporting units for the FY 2022 FFRD Survey is 319, which represents the 470 research-performing federal facilities.

The fiscal year referred to throughout this report is the federal fiscal year (2021 October 1 to 2022 September 30).

Data tables and detailed technical information are available at https://ncses.nsf.gov/surveys/federal-facilities-research-development/. For more information, please contact the Survey Manager.

NCSES has reviewed this product for unauthorized disclosure of confidential information and approved its release (NCSES-DRN24-064).

Notes

1 FFRDC R&D data can be found here: https://ncses.nsf.gov/surveys/ffrdc-research-development/.

2 See https://ncses.nsf.gov/surveys/federal-funds-research-development/ for more information on the Survey of Federal Funds for Research and Development.

3 See the questionnaires (Department of Defense [DOD] and standard versions) at https://ncses.nsf.gov/surveys/federal-facilities-research-development/2022#questionnaires for more details on what should be included and excluded from the R&D expenditure total.

4 The NCSES R&D surveys collecting R&D performance expenditures in the other U.S. economic sectors are the Annual Business Survey (businesses with 1–9 employees), the Business Enterprise R&D Survey (business with 10 or more employees), the FFRDC R&D Survey (the nation's 42 designated FFRDCs), the Higher Education R&D Survey (universities), the Nonprofit Research Activities Survey (nonprofits), and the Survey of State Government R&D (states). See https://ncses.nsf.gov/surveys for more details.

5 For additional information on DOD RDT&E, see Pece C, Jankowski J; National Center for Science and Engineering Statistics (NCSES). 2021. *Statistical Definition of Development Clarified: Effect on Reported Federal R&D Totals*. NSF 21-326. Alexandria, VA: U.S. National Science Foundation. Available at https://ncses.nsf.gov/pubs/nsf21326/.

6 For more information on DOD's RDT&E categories and the definition of operational system development, see the DOD Financial Management Regulation (FMR), Volume 2B, Chapter 5, at https://comptroller.defense.gov/portals/45/documents/fmr/current/02b/02b_05.pdf.

7 See the Technical Notes to the FY 2022 data tables for details on the survey frame and exclusions at https://ncses.nsf.gov/surveys/federal-facilities-research-development/2022#methodology.

Suggested Citation

Britt R; National Center for Science and Engineering Statistics (NCSES). 2024. *New Survey Shows R&D Performance Within Federal Facilities Totaled $34.5 Billion in FY 2022.* NSF 25-305. Alexandria, VA: U.S. National Science Foundation. Available at https://ncses.nsf.gov/pubs/nsf25305.

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